

# HOME SAFETY ASSESSMENT/INTERVENTION IN AMERICAN INDIAN HOMES IN CALIFORNIA: A ROLE FOR IHS ENGINEERING STAFF

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**ABSTRACT:** This study examines the feasibility of conducting a home safety assessment/intervention program for American Indian families in Northern California as part of the Indian Health Service (IHS) Sanitation Facilities Construction (SFC) program. Currently, the SFC program develops, improves, and provides sanitary water supply and wastewater disposal facilities to Indian homes in an effort to reduce environmentally related disease. As part of a typical project, engineering technicians spend several hours at each homesite evaluating the feasibility of supporting water supply and/or wastewater disposal facilities. During the site evaluation, the technician often experiences “down time” that can be directed toward other tasks like a safety assessment without additional salary cost to the IHS.

For this study, engineering technicians were trained to identify injury risk conditions in the home environment. A one page assessment form was used to record the absence or presence of smoke detectors, fire extinguishers, carbon monoxide detectors, fire safety plans, fall hazards, water heater temperature risks, poisoning hazards, etc. As part of the intervention, technicians installed smoke detectors, fire extinguishers, and first aid kits in participant’s homes that lacked this equipment.

During this study 109 homes were assessed between April and December 1998. The prevalence of homes with a working smoke detector rose from 58 percent to 96 percent. The prevalence of a mounted working fire extinguisher rose from 33 percent to 98 percent. The prevalence of a first aid kit rose from 3 percent to 99 percent. The amount of time needed for the assessment/intervention ranged from five minutes to 45 minutes, with an average of 18 minutes per site.

Traditionally, IHS engineering staff have not been involved in preventing injuries. The results of this study, however, indicate that IHS engineering staff can conduct a home safety assessment/intervention program in conjunction with normal duties. Because injuries are the second leading cause of death for Indian people, other IHS SFC program staff should consider implementing home safety assessments as part of their mission to raise the health status of American Indians and Alaska Natives to the highest possible level.

## Introduction

In 1997, unintentional injuries and deaths occurring in the home cost \$99.9 billion in the United States.

The rate of deaths caused by unintentional injury in the home was 10.6 per population of 100,000.

Injuries in homes are the second leading cause of unintentional injury deaths, exceeded only by motor-vehicle crashes. More disabling injuries take place in the home than in motor-vehicle crashes and workplace accidents combined. In 1997, about one person in 13 experienced a home injury resulting in medical attention or requiring one-half day on met, of restricted activity<sup>1</sup>. Most unintentional injury deaths of children younger than five years of age occur in the home<sup>2</sup>. Among American Indian people, unintentional injuries (excluding motor-vehicle injuries) are the third leading cause of death<sup>3</sup>.

There are several reasons to incorporate home safety assessments into the existing Indian Health Service programs. In an era of government reduction and funding cutbacks, providing the same level of service with fewer resources--or additional services with the same resources--becomes increasingly important. Home safety checklist intervention programs have been found effective in reducing hazards that cause home injuries<sup>4</sup>. Furthermore, the National Safety Council recommends conducting safety inspections in homes twice a year<sup>5</sup>. Among Indian homes in Northern California, there is a need for a assessment/intervention (A/I) program to improve injury prevention practices in home environments.

This study examines whether IHS can conduct a home safety A/I program in conjunction with the usual Sanitation Facilities Construction (SFC) Program operated under Public Law 86-121, using the existing SFC Program staff with negligible additional demands on resources such as money and time.

Figure 1: IHS Environmental Health Home Assessment Form

IHS ENVIRONMENTAL HEALTH HOME ASSESSMENT	
NAME _____	ADDRESS _____
DATE _____	_____
DATA:	
# of Children in home _____	# of smokers in home _____ # of people 60 yrs+ in home _____
Type of heat in home _____	Assessment time _____ Min. Travel time _____ Hrs.
Type of home: NEW BIA-HIP DHUD CDBG LIKE-NEW EXISTING	
FIRE	
<input type="checkbox"/> Operable <b>smoke detector</b> per bedroom and each floor _____	IHS installed <input type="checkbox"/>
<input type="checkbox"/> ABC type <b>fire extinguisher</b> _____	IHS installed <input type="checkbox"/>
<input type="checkbox"/> <b>First Aid Kit</b> + _____	IHS installed <input type="checkbox"/>
<input type="checkbox"/> <b>Emergency ☎ numbers</b> posted (Fire/Police/Ambulance/Poison Control) _____	
<input type="checkbox"/> <b>Carbon Monoxide Detector</b> _____	
<input type="checkbox"/> <b>Fire safety plan</b> (posted w/ exits, and meeting place--periodically discussed w/ family/babysitter) _____	
<input type="checkbox"/> Periodic <b>fire drills</b> _____	
<input type="checkbox"/> At least one working <b>flashlight</b> _____	
<input type="checkbox"/> Chimneys, stovepipes, heating systems periodically cleaned	
<input type="checkbox"/> Furnaces, fireplaces, hotwater heaters, space heaters, heat ducts clear of any obstructions and with adequate ventilation _____	
<input type="checkbox"/> No overloaded electrical circuits, no frayed electrical cords, no electrical cords under rugs or furniture	
<input type="checkbox"/> Matches, lighters, flammable liquids (in proper containers) stored away from heat and out of reach of children _____	
<input type="checkbox"/> <b>House number</b> and/or name clearly posted at driveway/entrance/mailbox _____	
<input type="checkbox"/> Driveway <b>access</b> /turn around for <b>emergency vehicles</b> (>20' wide, > 15' high, no sharp turns or locked gates) _____	
<input type="checkbox"/> Location of nearest <b>fire hydrant</b> (visible?) _____	
<input type="checkbox"/> Brush, dead grass, dead wood cleared >30' around home _____	
<input type="checkbox"/> <b>Water heater</b> temperature <120° F to prevent scalding _____	
Child Considerations	
<input type="checkbox"/> Medicines, cleaners, alcohol, matches, guns, insecticides, knives, razors, etc. locked up (remember kitchen, bathrooms, garages, basements) _____	
<input type="checkbox"/> <b>Car seat</b> for the car _____	
<input type="checkbox"/> <b>Bicycle helmets</b> _____	
<input type="checkbox"/> Fall hazards _____	
<input type="checkbox"/> Safety covers on electrical outlets _____	
<input type="checkbox"/> Curtain and blind cords out of child's reach _____	
<input type="checkbox"/> Household plant names known for poison control information (leaves out of reach) _____	
<input type="checkbox"/> Lead paint/plumbing fixtures/pipe? _____	
COMMENTS: _____	
_____	
Homeowner Initial: _____ Date: _____	IHS Staff Initial: _____ Date: _____

### The Existing SFC Program

The SFC Program develops, improves, or provides sanitary water supplies and waste-water disposal facilities to Indian homes in an effort to reduce environmentally-related disease. These sanitation projects include community facilities as well as projects that serve scattered individual homes. The IHS identifies sanitation deficiencies, design facilities, constructs sanitation facilities, and provides technical assistance and training. The California Area Indian, Health Service (CAIHS) has provided sanitation facilities for more than 15,000 homes. The SFC program has played a significant role in preventing environmentally-related disease. The age adjusted gastrointestinal disease death rate for American Indians has decreased 80 percent in the last 25 years from 6.2 to 1.4 per 100,000 population<sup>6</sup>.

In the course of a normal project

that serves scattered homes, engineering technicians visit each home site to evaluate the feasibility of supporting water supply or waste-water disposal facilities. The elements of an evaluation include determining property status, verifying standard house eligibility requirements (plumbing, heating system, electrical, etc), soil sampling, making test pits, administering percolation tests, surveying the site, testing water bacteria, interviewing the homeowner, and generating a site map. These activities consume several hours per site. In addition, simply reaching many of the sites involves several hours of travel. IHS personnel also return to each site during construction and to provide homeowner training. The technicians often spend time waiting for homeowners to fill out paper-work, for percolation test holes to drain, or for completion of various phases during construction inspection. This is called "standby time."

## Methods

Home Safety A/I The 20-minute IHS Environmental Health Home Assessment Form was developed for use in conjunction with SFC Program site evaluations (Figure 1). This one-page A/I tool helps identify injury risk conditions in the home environment, including the absence or presence of smoke detectors, fire extinguishers, first-aid kits, carbon monoxide detectors, fire safety plans, safe storage practices or hazards, and water heater temperature risks. The IHS assessment form was created by compiling numerous checklists and home hazard concerns named by local counties, foster care agencies, Internet articles, and home safety texts. This information was further refined and edited into a simple one- page form. The purpose of honing the form in this manner was to ensure that the A/I could be performed within the 20 minutes specified by the study hypothesis. Nearly all the items on the form were physically

<b>Table 1: Pre- Intervention Condition of Homes</b>		
<b>Item</b>	<b>Homes (n = 109)</b>	<b>Percentage of Homes</b>
Working smoke detector	63	57.8
Non working smoke detector	15	13.8
Fire extinguisher	36	33.0
First aid kit	3	2.8
Posted emergency phone numbers	35	32.1
Carbon monoxide detector	6	5.5
Fire escape plan	31	28.4
Electrical hazard	35	32.1
Visible house number	72	66.1
Emergency-vehicle access	83	76.2
Available fire hydrant	57	52.3
Brush cleared for 30 feet around home	87	79.8
Hot water temperature less than 120°F	52	47.7

verifiable in the home environment (i.e., hot water temperature), while self-reported behavior measurements (i.e., child never left alone in bath) were kept to a minimum.

The A/I results were discussed with each homeowner. As part of the A/I, smoke detectors, fire extinguishers, and first-aid kits were installed in participant homes that lacked this equipment. Photoelectric smoke detectors were installed because they provide optimal protection from smoking-related fires, while nuisance alarms caused by cooking occur at a lower rate than with other types of smoke detector<sup>7</sup>.

One hundred and nine homes were assessed in this study. All of the homes were SFC Program participant homes within the Redding District, which encompasses the 10 northernmost counties in California. Each participant had requested water or waste water facilities from the IHS. During the assessment, the condition of the home prior to any intervention was recorded. Thus, the pre-intervention data represent the condition of SFC participant homes without the IHS home safety A/I, and the post A/I data represent the condition of SFC participant homes after the A/I.

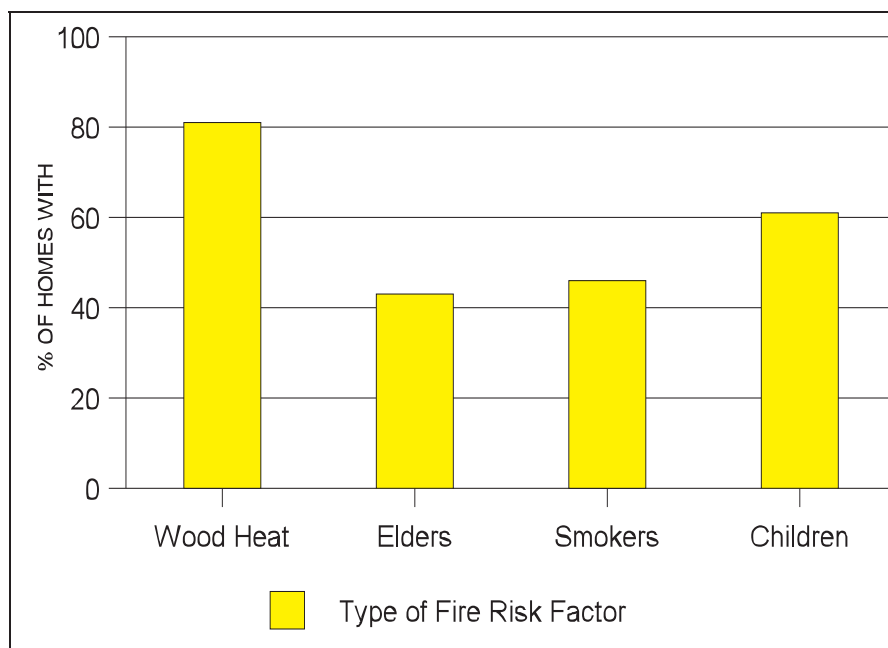
Each home safety A/I was performed by one of the three Redding District SFC engineering technicians. The technicians were trained to follow identical A/I procedures. Each technician received a Home Safety Handbook, in which a collection of articles provided in-depth information on each topic addressed by the A/I.

Homeowners were asked to sign the A/I form to verify the information collected. For quality control purposes, an engineering student intern reassessed 30 homes to validate the accuracy of the data. The assessments/interventions were performed during April through December 1998.

To evaluate the effectiveness of the program, the presence of three items were tracked before and after the A/I was conducted: an operable smoke detector; a fire extinguisher; and a first-aid kit. These three items were chosen for tracking because they constituted clear, objective measures of the impact the program, and because they are recognized as sound injury control devices.

The amount of time required to perform each A/I was recorded on the form. These data were

**Figure 2: Type and Percent of Fire-Related Risk Factors**



used to assess the additional workload involved in delivering the program.

## Results

Data representing the pre-intervention condition of the homes are shown in Table 1. Figure 2 shows the percentages of assessed homes with fire-related risk factors, including the presence of children, smokers, or adults over 60 years of age. The results of the program evaluation are illustrated in Figure 3. The prevalence of assessed homes with working smoke detectors rose from 58 percent to 96 percent. The prevalence of homes with a mounted, working fire extinguisher rose from 33 percent to 98 percent, and the prevalence of homes with a first-aid kit rose from three percent to 99 percent. The additional technician workload created by incorporating the home safety program into the SFC program is reflected in the time required to conduct the A/I. The time ranged from five minutes to 45 minutes, with the average A/I taking 18 minutes. Travel time from office to site ranged from 15 minutes to five hours, with an average travel time of 3.42 hours.

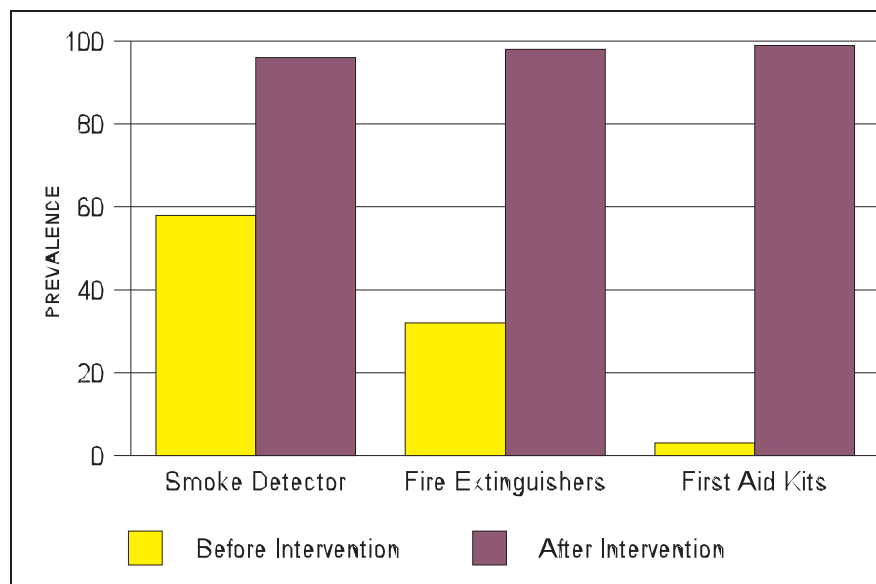
Figure 4 shows the prevalence of working and non-working smoke detectors according to risk factors such as the presence of smokers, children, or older adults. About 13 percent of assessed homes had smoke detectors that did not work. Figure 5 shows the prevalence of working and non-working smoke detectors according to type of home. Owner-financed new homes had the highest prevalence of smoke detectors, followed by homes that were financed by the government. Older homes had the lowest prevalence of smoke detectors.

The reassessment of 30 homes by an engineering student intern validated the accuracy of the A/I data collected by the technicians. For virtually every home, the data on presence and absence of injury prevention devices matched.

## Discussion

Before we began the A/Is, the prevalence of smoke detectors in this study was only 58 percent (Figure 3). By comparison, the 1995 national prevalence was 93.6 percent, and the prevalence among California households was 92.7 percent<sup>8</sup>. A/Is raised the prevalence of smoke detectors to 96 percent among homes in the study. The increase in smoke detector use resulting from this program is significant since the presence of a smoke detector reduces the risk of residential fire death by approximately 40 percent<sup>9</sup>.

**Figure 3: Presence of Injury Prevention Devices in Homes Before and After Intervention**



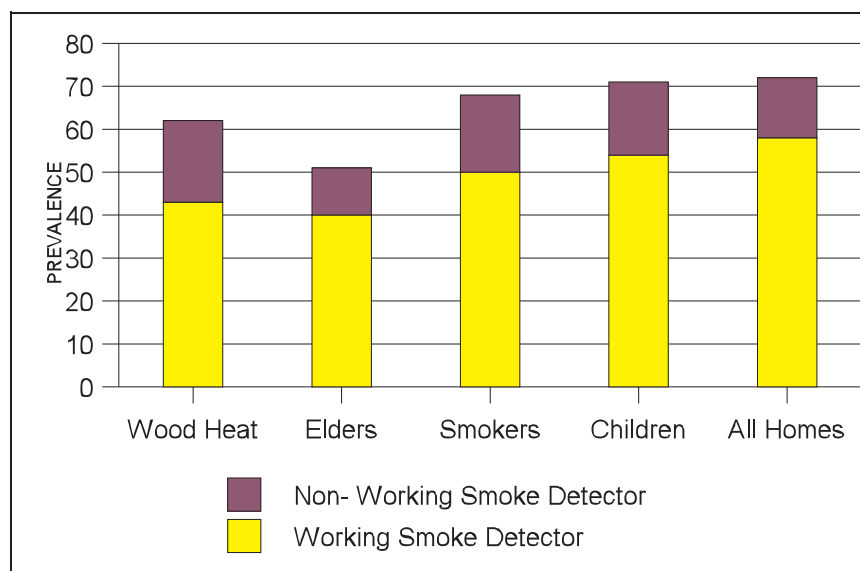
Children under 15 years of age make up 33 percent of the American Indian population; by comparison, children constitute only 22 percent of the general population<sup>6</sup>. This study found children living in 61 percent of assessed homes and adults over 60 years of age in living in 43 percent of assessed homes. Children younger than six years of age and adults older than 65 years of age have a fire-death rate two to six times greater than the national average for all ages<sup>10</sup>. In 1991, residential fires were the second leading cause of injury deaths for children between one and 10 years of age and the sixth leading cause of injury deaths for adults over 65 years of age<sup>11</sup>. Approximately 90 percent of fire-related deaths among children under five years of age take place in homes without a functioning smoke detector<sup>12</sup>. As shown in Figure 4, homes with children had a slightly lower prevalence of proper smoke detector usage than the average of all homes assessed. Homes with older adults had the lowest prevalence of smoke detectors.

From 1991 to 1995, U.S. residential fire- related death rates were greatest from December through February and lowest from June through August<sup>3</sup>. This seasonal variation has been attributed in part to the use of heating devices such as wood stoves and portable space heaters<sup>8</sup>. For 1990, the National Fire Incidence Reporting System (NFIRS) ranked heating devices as the second leading cause of deaths among children and older adults from fires with known causes, and, in general, cooking and heating devices were reported to be the most common cause (39 percent) of residential fires<sup>13, 14</sup>. In this study, wood stoves or portable kerosene heaters were the reported heat sources for 81 percent of assessed homes. As shown in Figure 4, homes with wood heat had a lower prevalence of smoke detectors than did the total of homes assessed.

Smokers resided in 46 percent of the homes in this study. NFIRS data indicate that careless smoking was the leading cause of fire death among older adults in 1991<sup>13</sup>. Smoking also was found to be the ignition source of 23 percent of all house fires that resulted in death in 1991<sup>7</sup>.

For 1990, NFIRS ranked faulty or misused electrical distribution sources (e.g., wiring, transformers, meter boxes, outlets, cords, plugs, and lighting fixtures) as the third leading cause of deaths among children and older adults from fires with known causes<sup>13</sup>. Thirty-two percent of the homes in this study presented electrical problems, including faulty wiring, overloaded circuits, frayed electrical cords, arcing in circuit boxes, and failure to meet the requirements of the Uniform

**Figure 4: Smoke Detector Prevalence by Type of Risk Factor**



Electrical Code. Electrical concerns were immediately brought to the attention of homeowners during the assessments.

Since installation of the devices was part of the A/I program, it was expected that post assessment tracking would find an increase in the prevalence of injury control devices. Homeowners expressed more willingness to have the safety A/I performed after learning that the technician would be installing the devices if needed. The major reason that the post-A/I prevalence of safety devices was not 100 percent was that a few homeowners simply did not want the devices in their homes. Four homeowners did not want smoke detectors for fear of nuisance alarms. Two homeowners did not want fire extinguishers, one homeowner expressed fear of fire extinguishers, and one homeowner did not want the first-aid kit.

The majority of each A/I took place during the process to determine that homes met the standard definition to qualify for sanitation facilities services under Public Law 86-121. The average time required to perform an A/I was only 18 minutes. However, not all of the assessments/interventions could be performed within the parameters of existing activities or during standby time. In addition, the A/I program generated extra administrative work, with forms to be filed and inventories of injury devices to be tracked. The extra administrative work took 15 to 30 minutes each week. No extra travel time was attributed to the A/I program, since the technicians had to travel to the sites to perform their normal work anyway rather, combining the assessments/interventions with SFC work constituted an economy of time. The 18 minutes required for each A/I were nominal compared with the average of 3.42 hours that was already invested at each site. None of the technicians stated that performing the A/I noticeably added to their workloads by causing inconvenience or delays in their regular duties.

The purchase of the smoke detectors, fire extinguishers and first-aid kits was the major cost of the program. The CAIHS Injury Prevention Program provided the devices for the study. Each smoke detector cost \$8.99, each fire extinguisher cost \$18.41, and each first-aid kit cost \$10.31. The average cost for injury prevention devices was \$25.12 per home. If the 18 minutes per site is tallied exclusively as an A/I cost, then the cost in terms of technician salaries was \$6 per site. The additional administrative work cost about \$3 per site. Therefore, the cost of implementing this program was just under \$35 per home.

It is recommended that the checklist used for this study be expanded into a more comprehensive safety assessment. The Bemidji Area IHS has a Home Safety Checklist pilot program conducted by public health nursing staff on the Fond du Lac Indian Reservation<sup>4</sup>. The checklist used in that program is longer and more in-depth. The Bemidji program also has a wider variety of injury control devices to distribute, including trigger locks, night lights, syrup of ipecac, cabinet locks, and grab bars for elders<sup>4</sup>. The IHS California Area A/I program could provide additional devices and might have a greater positive impact, but the cost would be higher.

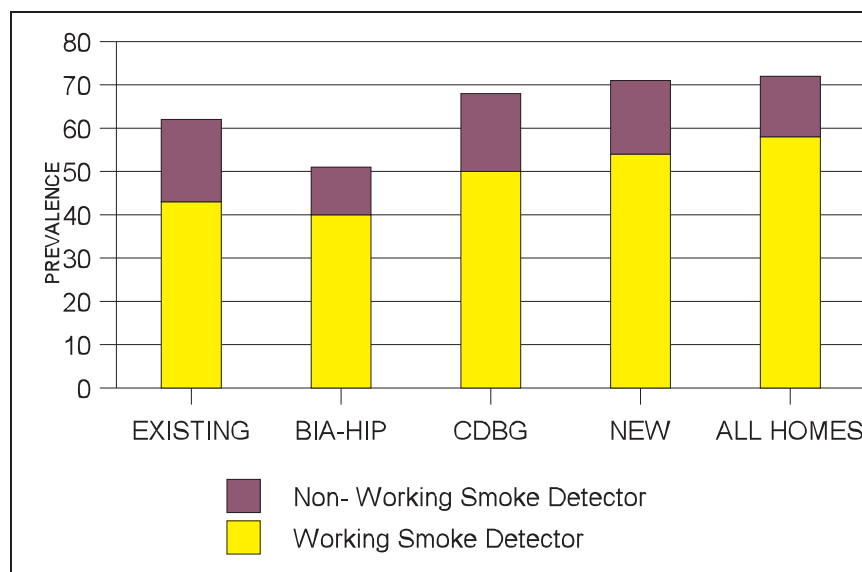
Most of the CAIHS engineers and technicians involved in this program supported it enthusiastically, particularly in light of the low cost, the little time involved, and the impact of injuries on Indian people. An incident that occurred in March of 1999 solidified support for the program in the Redding District: A

Bureau of Indian Affairs Home Improvement Program (BIA-HIP) home that had received sanitation facilities from the SFC office in 1997 (before the A/I program began) burned down. The fire killed all the occupants.

Home safety A/Is have great potential in contributing to positive public education and awareness of injury prevention because IHS staff talk personally in a one to one manner with each participant. Not only do participants become aware of

injury risks in their homes, but they also learn about injury prevention issues and the effects of injury on the American Indian population as a whole. Health education in the form of pamphlets, brochures, and referrals also could be tailored to clients' specific concerns.

**Figure 5: Smoke Detector Prevalence by Type of Home**



## Conclusion

This study showed that IHS can conduct a home safety A/I program in conjunction with the usual operation of the SFC Program. Existing SFC Program staff can be used with negligible additional demands on resources such as money and time. Home safety A/Is can be performed in an average of less than 20 minutes per site. The addition of this service to the IHS environmental health program increases the effectiveness and efficiency of the program with respect to its mission, which is to raise the health status of American Indians and Alaska Natives to the highest possible level. The added home safety A/I activity makes the SFC Program more effective and more efficient since two tasks are performed at once. Because injuries are a leading cause of death, other health programs that conduct home visits should consider providing this valuable service.

*Note: Opinions expressed in this paper are opinions of the authors and do not express the opinions of the Indian Health Service*

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